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## Initial evaluation of the effects of competitive memory training (COMET) on depression in schizophrenia-spectrum patients with persistent auditory verbal hallucinations: A randomized controlled trial

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**Objectives.** This study investigates whether depression can be ameliorated by weakening the associations between auditory verbal hallucinations and easily activated networks with negative self-evaluations, by strengthening the access to competing memories of positive self-esteem.

**Design.** A randomized controlled clinical trial comparing competitive memory training (COMET) with treatment as usual (TAU) in schizophrenia patients with persistent auditory hallucinations.

**Methods.** Patients with schizophrenia-spectrum disorders were randomized into COMET ( $n = 39$ ) versus TAU ( $n = 38$ ). COMET consisted of seven sessions with four stages: (1) identification of aspects of negative self-esteem reinforced by the voice; (2) retrieval and re-living of memories associated with positive self-esteem; (3) positive self-esteem is brought in to compete with the content of the voices to weaken the association between voice content and negative self-evaluation; and (4) learning to disengage from the voices and to accept the voices as psychic phenomena.

**Results.** Compared to TAU the COMET group improved on depression but there were no significant effects on auditory hallucinations. The effect of COMET on depression was fully mediated by self-esteem and acceptance of voices, and partially mediated by social rank and attributed power to the voices.

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**Conclusions.** COMET can be helpful in reappraising the meaning and changing the emotional impact of auditory hallucinations. These findings are consistent with the results of comparable COMET protocols applied in other psychiatric diagnoses. The technique can be used within regular cognitive behavioural therapy.

Auditory verbal hallucinations are present in about 60% of schizophrenia patients (Slade & Bentall, 1988) and treatment with antipsychotic medication is only partly effective. About 25–30% of patients have persistent hallucinations that interfere with their daily life, despite adequate antipsychotic treatment (Meltzer, 1992). In the case of imperative hallucinations, cognitive behavioural therapy (CBT) can be helpful by challenging the attributed power to the voices. If this power diminishes, people tend to stop acting on the imperatives (Buccheri, Trygstad, & Dowling, 2007; Trower *et al.*, 2004). Although one review found evidence for an association between voice appraisal and distress, CBT targeting appraisals has not always resulted in reduced distress. In addition, interpersonal schemata probably have a mediating role and a change in these schemata might produce a more successful outcome (Mawson, Cohen, & Berry, 2010).

Social ranking is one such social schema that mediates depression (Gilbert *et al.*, 2001). Birchwood *et al.* used structural equation modelling to test three different models of hallucinations, depression, and appraisal processes. They found that an interpersonal attitude of subordination to others (low self-ranking) leads to both depression and submission to voices. The models wherein depression or psychosis leads to hallucinations and submission to voices were statistically rejected. Low social self-ranking underlies the development of depression (Birchwood *et al.*, 2004). In addition, appraisals of defeat and entrapment (associated with low ranking) are associated with depression and suicidal ideation and behaviour (Taylor *et al.*, 2010).

Self-esteem might be another mediator. Individuals with more depression and lower self-esteem had auditory hallucinations of greater severity and more intensely negative content, and were more distressed by the voices (Smith *et al.*, 2006). Moreover, low self-esteem is also associated with the development of positive symptoms in the general population (Krabbendam *et al.*, 2002). Fannon *et al.* confirmed this importance of low self-esteem. Both low self-esteem and beliefs about voices acted independently to contribute to depression and persistent auditory hallucinations. The authors concluded that low self-esteem is of fundamental importance to the understanding of affective disturbance in voice hearers. Therapeutic interventions need to address both the appraisal of self and hallucinations in schizophrenia. Interventions that ameliorate low self-esteem can be expected to improve depressed mood in this patient group (Fannon *et al.*, 2009). A small randomized clinical trial with CBT for self-esteem resulted in increased self-esteem, decreased psychotic symptomatology, and improved social functioning; these benefits were largely maintained at 3-month follow-up (Hall & Tarrier, 2003).

This raises the question whether an intervention using imagery that aims to improve positive self-esteem, to tolerate voices, and to distance oneself from voices can change depression in schizophrenia patients with persistent auditory verbal hallucinations. Another analysis is whether self-esteem, acceptance of voices, attributed power, and social comparison with the voices mediate the changes in depression.

Brewin stated that all effective psychotherapy is based on competing memory networks (Brewin, 2006). For instance, in depression, all kinds of stimuli easily elicit negative memories and mood, while networks with more positive thoughts and feelings are hard to activate. Successful treatment changes the hierarchy of triggering positive

versus negative memory networks. The practical translation of this suggested learning principle into a therapy protocol, means that the main issue is whether or not we can intrude on the over-learned connection between voice content, negative self-esteem, and submissiveness. Korrelboom *et al.* developed competitive memory training (COMET) as a transdiagnostic imagery training protocol to learn to feel (experientially) what you already know (intellectually), and to use imagery to enhance positive self-esteem (Korrelboom, de Jong, Huijbrechts, & Daansen, 2009; Korrelboom, Marissen, & van Assendelft, 2011; Korrelboom, Van der Gaag, Hendriks, Huijbrechts, & Berretty, 2008; Korrelboom, van der Weele, Gjaltema, & Hoogstraten, 2009). Adaptations have been made to the procedure to accommodate severely psychotic patients who often suffer attention and memory problems. The protocol aims to enhance positive self-esteem and also teaches the patient to tolerate imagined voices and to distance oneself from the voices. The relationship to the voices becomes increasingly indifferent rather than submissive (van der Gaag & Korrelboom, 2010).

The main aim of the present study is to test whether COMET + treatment as usual (TAU), in comparison with TAU alone, can reduce depression in patients with persistent hallucinations. A secondary outcome is to test the influence of COMET on auditory verbal hallucinations.

Also explored are mediators that might account for the therapeutic effects. COMET aims to increase positive self-esteem and then uses the experienced positive self-esteem to create distance from the voices and thus become more detached from them. We hypothesize that not only self-esteem and acceptance of voices are mediators, but also the appraisal of voices (e.g., the power attributed to the voices) and social ranking will mediate these changes when they occur.

## Methods

### Design

This study was a multicentre, single blind randomized two-group clinical trial. The protocol was approved by the METIGG (a medico-ethical board in the Netherlands). All patients enrolled in the study signed a written informed consent. The two measurement moments were baseline and the end of treatment 2 months later.

COMET is described in an individual and highly manualized protocol with instructions for therapist and patient, with response forms for homework, individual problem formulation and registration forms.

TAU is the general treatment protocol for patients with persistent psychosis in the Netherlands. Most patients have antipsychotic medication and at least 6-months contact with a psychiatrist and monthly contact with a community psychiatric nurse.

Activities during the COMET sessions are recorded by the patient and therapist in the workbooks. The progress of training and workbooks are discussed during supervised sessions to guarantee fidelity. The protocol can be obtained from the first author in either Dutch or English. The participating institutions and universities provided financial support for this study.

### Randomization

Randomization was performed by an independent randomizer (making use of a randomization website) who randomly assigned patients (after baseline testing) to the COMET

+ TAU group, or to the TAU alone group. Allocation was confirmed by fax to the local coordinating therapist.

### **Measurement instruments**

- (1) Diagnoses were confirmed by trained senior researchers using the Schedules for Clinical Assessment in Neuropsychiatry (SCAN 2.1) (Giel & Nienhuis, 2001)
- (2) The primary outcome of depression and the secondary outcome of auditory hallucinations were assessed by:
  - the Beck Depression Inventory-II (BDI2) (Beck, Steer, & Brown, 1996)
  - the Auditory Hallucinations Rating Scale, a subscale of the Psychosis Rating Scales (PSYRATS-AHRS) (Haddock, McCarron, Tarrier, & Faragher, 1999)
- (3) Variables that are supposed to mediate the reduction of depression were:
  - the Self-Esteem Rating Scale (SERS) that measures positive and negative self-esteem (Lecomte, Corbière, & Laisné, 2006). We used the combined score of positive self-esteem minus negative self-esteem;
  - the Voices Acceptance and Activity Schedule A (VAAS) that measures the acceptance of voices and the willingness to involve in daily life despite voices (Shawyer *et al.*, 2007). (The B part is specific for command hallucinations and was not administered for this study);
  - the Social Comparison Ranking Scale (SCRS) that measures the social distance (superiority vs. inferiority) to the voices (Birchwood, Meaden, Trower, & Gilbert, 2002);
  - the Power-Subscale of the Beliefs about Voices Questionnaire-Revised that measures the level of power attributed to the voice (Chadwick, Lees, & Birchwood, 2000)

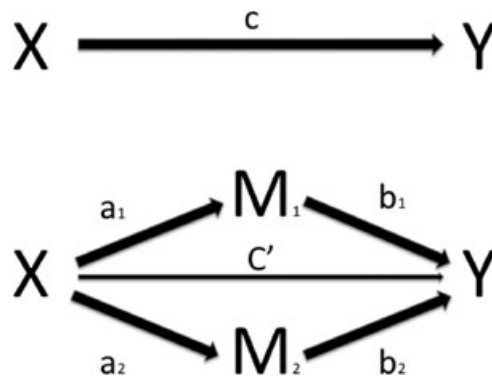
Research assistants were trained to do the assessments with the self-rating scales (i.e., b and c) and were blind to the condition of the patient.

### **Participants**

Clinicians in two psychiatric institutions (Parnassia, The Hague and Reinier van Arkel, 's-Hertogenbosch) and one university hospital (University Medical Centre Utrecht) screened their case load for patients with schizophrenia-spectrum disorder and persistent auditory verbal hallucinations on severity. They referred the patient to the research for further diagnosis and assessment. Those patients who had a diagnosis in the schizophrenia-spectrum (SCAN 2.1) with pharmacotherapy refractory auditory verbal hallucinations of daily occurrence (PSYRATS-AHRS Item 1  $\geq 2$ ), with at least moderately intense suffering (PSYRATS-AHRS Item 9  $\geq 2$ ) and at least moderate disturbance of activities of daily living by the voices (PSYRATS-AHRS Item 10  $\geq 2$ ) were asked to participate in the study.

Exclusion criteria were organic disease, insufficient knowledge of the Dutch language, and IQ <70. Figure 1 shows the patient flow.

A total of 77 subjects participated in the study; Table 1 presents their baseline characteristics. The patients experienced auditory hallucinations for a (mean) period of 13.3 ( $SD = 11.6$ ; range 1–51) years. As can be seen, the group is not only persistently psychotic but the level of depression is also relatively high. In the COMET group 62% (24 out of 39) and in TAU 61% (23 out of 38) of the patients were moderately to



**Figure 1.** Path models of the total effect of treatment on symptoms (upper figure) and multiple-mediated effects of treatment on symptoms (lower figure).

Note. C, total effect of treatment X on symptoms Y; C', direct effect of treatment X on symptoms Y with mediators partialled out; a1 and a2, effect of treatment X on mediators M1 and M2; b1 and b2, effect of mediators M1 and M2 on symptoms, irrespective of treatment condition.

**Table 1.** Characteristics of the study sample at baseline

Sex	COMET 21 male/18 female	TAU 19 male/19 female
Diagnosis		
Disorganized	1	3
Undifferentiated	1	0
Paranoid	28	25
Residual	2	0
Schizo-affective	3	2
Psychosis not otherwise specified	4	8
Level of education (1–7)	4.4 (1.6)	4.4 (1.4)
Age	40.4 (12.0)	40.6 (12.1)
SCRS	47.7 (19.8)	51.8 (26.5)
BaVQ-R power	11.8 (4.0)	10.2 (4.3)
VAAS A	35.5 (8.6)	36.0 (7.5)
SERS-positive	40.7 (13.8)	43.1 (13.3)
SERS-negative	39.6 (14.1)	38.8 (14.8)
BDI-II	23.9 (13.1)	23.1 (12.0)
AHRS	29.9 (5.0)	29.6 (5.4)

SCRS, Social Comparison Rating Scale; BaVQ-R power, Beliefs about Voices Questionnaire – Revised power subscale; VAAS A, Voices Acceptance and Action Scale general voices part; SERS positive, Self-Esteem Rating Scale positive Self-Esteem; SERS negative, Self-Esteem Rating Scale negative Self-Esteem; BID-II, Beck Depression Inventory-II; AHRS, Auditory Hallucination Rating Scale.

severely depressed (score 19–29) or severely depressed (score  $\geq 30$ ), as assessed with the BDI-II

During the study period, 11 COMET subjects dropped out for various reasons, for example, the daily homework was too much, unable to imagine and re-live past positive experiences, no positive experiences at all, etc. All the control subjects completed

the study. Comparison of the dropouts and completers showed no differences regarding baseline scores and demographic characteristics. Comparison of the completers in both conditions also showed no differences regarding baseline data. An unmeasured characteristic, such as perseverance, might explain why some people dropped out.

## **Treatment**

### *The COMET protocol*

*Stage 1: The theme of the voice content.* The first stage of the protocol starts with registering the voice activity, voice content, thoughts, and feelings. During the session, the patient and therapist first examine the personal meaning of the voice content. For example, humiliating voices prompt memories of personal failures in the past and induce low self-esteem and a depressed mood. The cognitive-emotional memory network that is activated over and over again by the voices is, for instance, characterized by the theme ‘incompetence’. Because of the frequent occurrence of the voices, this network of incompetence is easily activated and memory bias is towards sad memories, whilst memories of personal successes and competence are hard to access. Voices seem to have the same perpetuating role as worrying does in depression; they propel the low-mood and low-activity levels.

*Stage 2: Strengthening the counter theme.* Once the problematic core theme is agreed upon, the antagonistic functional network is strengthened in the second stage. Patients are asked whether they are totally convinced that they are ‘100% incompetent’ or that they are a ‘total failure’. If not, personal examples of the positive counter theme (instances of ‘being competent’ or ‘being successful’) are elicited and these are put into a scene that the patient has to imagine. Then, at the same time, the patient has to (sub) vocalize a positive self-statement that is congruent with the personal characteristics that are active in the imagined scene. In the next sessions, the ‘visual and audio tracks’ of the memory are combined with the correct posture, and facial expression (indicative for being a ‘competent’ or a ‘successful’ person) to re-live and experience the pleasant situation from the past. When the situation is re-lived, this can be validated by checking the patient’s smiles/expression, firm posture, and the spoken self-report. The patient is asked to practice the recollection and re-living experience five times a day, every day of the week for about 3 min each time. Over-learning is essential to enhance the accessibility of the positive network (Brewin, 2006). The exercises are individually planned to fit in the agenda of the patient. Each exercise is scored by the patient in a homework booklet in three columns: time of exercise; successful in re-living, or not; and a 0–100 score for believability of the re-living experience.

*Stage 3: Weakening the association between voices and negative self-esteem.* In the third stage, the emotional meaning of the core theme is re-evaluated with the aid of other experiential techniques. After a couple of weeks, when the patient is able to almost instantaneously activate the over-learned positive image, posture, and self-speech, this is blended with the imagined voices. This is repeated until the patient is able to listen to the humiliating messages of the voice and still be in a self-confident mood. The negative

implication of what the voices say, no longer affects the feelings of the patient. This practice is also over-learned by rehearsing this combined scene (negative voice with positive image, posture, facial expression, and self-speech) five times a day.

*Stage 4: Distancing from the voices.* In the last stage of training, the patient is trained to let go of the involvement in what the voices tell him. This is accomplished by inducing boredom or indifference while watching the voices and listening to them in an imagined theatre. Fading out the sound level in the image, or blurring the visual aspects of the image, can enhance this 'distancing effect'. Another variant is to 'zoom out' the image into a miniscule scene of the voice and the voice-hearer.

### **Sample size**

In earlier studies, the COMET procedure has achieved medium to large effect sizes. An effect size of 0.65, an alpha of 0.05 and a power of 0.80 require a total sample size of 82 participants.

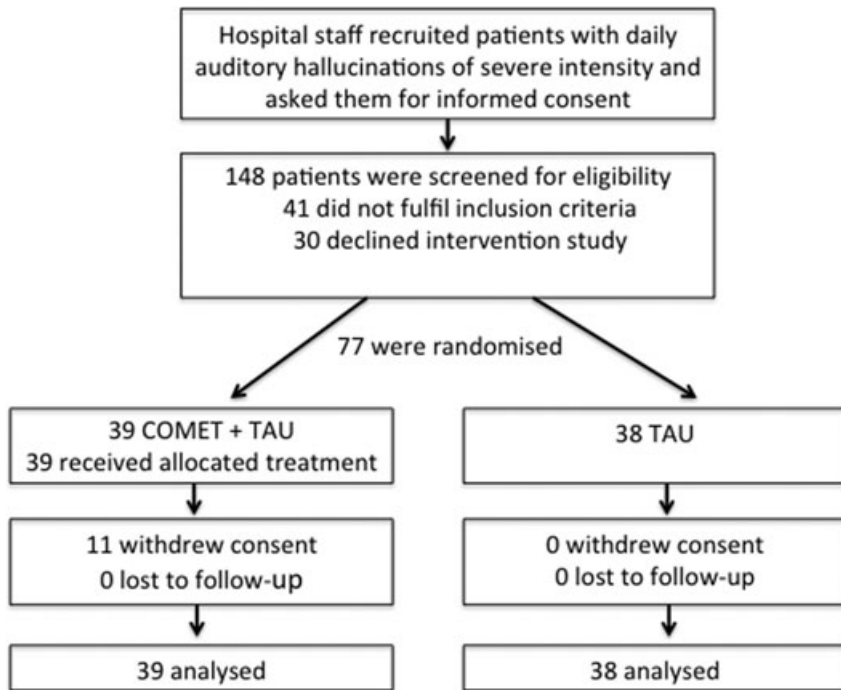
### **Data analysis**

ANCOVA loses power by deleting cases with incomplete data. Imputation of data to overcome the problems of missing values is often disputed. In the present study, the effects are analysed with linear mixed modelling (LMM) and restricted maximum likelihood based on normality. LMM is preferred to ANCOVA as it processes all available data and can handle missing values and by doing so saves statistical power. The data of all participants were analysed on an intention-to-treat basis.

LMM was performed with the patients as random effects and treatment condition, moment of testing and the interaction as fixed effects. The covariance structure was set to unstructured. Baseline scores were used as covariates in these models so that all comparisons between participants were adjusted for baseline differences. The experimental factors, randomization group (COMET + TAU or TAU) and time (baseline or post-therapy), were included in the model as fixed main effects. An interaction term and random effects for participants were included. A significant interaction term would be interpreted as a differential COMET effect at the two time points.

Deeper understanding is gained when we comprehend the process that causes the effect. A variable is a mediating variable if it accounts for (to a certain extent) the association between therapy and symptom reduction. We speak of perfect or complete mediation when the effect of therapy on symptoms is absent, when controlled for the mediator. When the effect of therapy on symptoms is reduced by a non-trivial amount, but not to zero, partial mediation is said to have occurred (Baron & Kenny, 1986). To demonstrate mediation, the causal steps strategy has to be applied (Figure 2). This means that several conditions must be met: (1) the effect of treatment on symptoms (c path); (2) the effect of treatment on the mediator (a path); (3) the effect of the mediator on symptoms irrespective of treatment condition (b path); and (4) the effect of treatment on symptoms without the indirect effect of the mediator must be reduced or absent (c' path). For multiple mediators, the advanced procedure is the bootstrap method that can handle non-parametric data and relatively small sample sizes (Preacher & Hayes, 2008). This procedure is applied in the present study. The algorithm and syntax for SPSS 18 are available on the Internet.





**Figure 2.** Flow of participants in the study.

To give an impression of the clinical gain, we calculate the clinically significant change (Jacobson & Truax, 1991). Cahill *et al.* defined the clinically significant change compared to a norm population. To be recovered, the BDI score had to drop at least 7 points and be in the normal range of 0–13 (Cahill *et al.*, 2003).

## Results

COMET + TAU resulted in a significant decrease of depression with a medium-to-large effect size as measured with the BDI-II.

Changes in the auditory hallucinations were not significant on the total score of the PSYRATS-AHRS. Inspection of subscale scores showed that the physical characteristics subscale and the negative emotional content of the voices subscale stayed unaffected, but the cognitive interpretation subscale improved in the COMET condition (Table 2).

To test mediation, change scores were computed by subtracting the pre-score from the post-score for depression, self-esteem positive minus negative self-esteem, voice acceptance, social ranking, and attributed power. Table 3 presents the results of the multiple mediator analysis.

The total mediator model is significant  $F(5, 71) = 10.013$ ,  $p = .0000$ . The total explained variance ( $R^2$ ) is 41%. The adjusted  $R^2$  is 37%. Self-esteem and acceptance of voices fulfilled all the criteria for full mediation: therapy affected the mediator (path a), the mediator affected the depression (b), the direct effect of therapy on depression disappeared when corrected for the mediators (path c'), the bootstrap indirect effects are significant.

**Table 2.** Results of linear mixed modelling of the primary and secondary outcome measures

	Pre-test		Post-test		<i>F</i> interaction ( <i>df</i> )	Sig. level	Effect size
	COMET + TAU mean (SE)	TAU mean (SE)	COMET + TAU mean (SE)	TAU mean (SE)			
BDI-II	23.9 (2.0)	23.1 (2.0)	18.3 (2.5)	23.3 (2.4)	7.59 (1.64)	0.008	0.64
PSYRATS-AHRS	29.9 (0.8)	29.6 (0.8)	26.0 (1.2)	27.4 (1.1)	1.70 (1.64)	0.197	0.30
PSYRATS-AHRS cognitive interpretation	10.3 (0.4)	10.1 (0.4)	8.0 (0.6)	9.5 (0.5)	7.23 (1.63)	0.009	0.63

BDI-II, Beck Depression Inventory-II; PSYRATS-AHRS, Psychosis Rating Scale – Auditory Hallucination Rating Scale; PSYRATS-AHRS appraisal, cognitive interpretation of voices subscale of the Psychosis rating Scale-Auditory Hallucinations Rating Scale.

**Table 3.** Results of multiple mediation analysis on depression with bootstrap indirect results

	Direct and total effects <i>p</i> -values			Bootstrap indirect effects 95% confidence interval <i>a</i> × <i>b</i>	
	<i>a</i>	<i>b</i>	<i>c'</i>	Lower limit	Upper limit
TOTAL				1.803	10.008*
SERS pos-neg	0.001	0.050	0.840	0.172	3.248*
VAAS A	0.039	0.014	0.840	0.162	3.274*
SCRS	0.005	0.172	0.840	−0.551	3.561
BaVQ power	0.001	0.084	0.840	−0.043	3.472

*A*, effect of treatment on the mediator; *b*, effect of the mediator on depression irrespective treatment condition; *c'*, effect of treatment on depression without the indirect effect of the mediator; *a* × *b*, bootstrap results for indirect effects; lower and upper limits of confidence intervals for test of mediation with 5,000 bootstrap re-samples and bias correction; SERS pos-neg, Self-Esteem Rating Scale positive minus negative subscale; SCRS, Social Comparison Ranking Scale; BaVQ power, power subscale of the Beliefs about Voices Questionnaire; VAAS A, Acceptance and Action subscale of the Voices Acceptance and Activity Scale; \*Significant at 0.05.

In total, 36% (10 out of 28) of COMET patients and 11% (4 out of 38) of the TAU group attained recovery from depression (a reduction of at least 7 points and a score of 0–13 on the BDI).

# Discussion

This study demonstrates that in schizophrenia-spectrum patients with refractory and persistent auditory hallucinations, depression can be diminished with the help of an imagery technique. About a third of the people with COMET training achieved complete recovery from depression and these improvements were obtained within a limited number of sessions.

This study could not demonstrate a reduction in voice activity or the negative content of the voices. The voices are still there and still repeat what they have been saying all

the time; however, this was not the target of the intervention. Only the subscale that measures beliefs about the internal versus external origin of the voices, the level of disruption of daily life, and control over voices of the PSYRATS, improved in the COMET + TAU condition.

The reduction in depression is fully mediated by the increase in self-esteem and the acceptance of voices as psychic phenomena, and partially mediated by the attributed power to the voices and the social ranking of oneself in relation to the voices. Therefore, a cognitive model can explain the depression in this sample of patients with persistent auditory hallucinations. Fannon *et al.* reported independent contributions of self-esteem and power beliefs to depression in patients with persistent auditory hallucinations (Fannon *et al.*, 2009), and our results support their study. Also Birchwood *et al.* reported that power beliefs determined depression (Birchwood, Iqbal, & Upthegrove, 2005); in the present study, social ranking and power beliefs partially mediated the effects.

These findings provide further support for the effectiveness of COMET as a procedure to help patients gain positive self-esteem and become less involved with their symptoms. This beneficial effect was earlier found for the COMET-obsessions protocol in an uncontrolled pilot study with treatment-resistant patients with obsessive-compulsive disorder (Korrelboom *et al.*, 2008), for the COMET protocol for low self-esteem in a baseline-controlled study with hospitalized patients with eating disorders and/or personality disorders (Korrelboom *et al.*, 2009) as well as in a randomized controlled trial in outpatients with eating disorders (Korrelboom *et al.*, 2009), and for improved self-esteem in personality disorders (Korrelboom *et al.*, 2011). All these studies also showed a combined improvement in self-esteem as well as in depression. It would be interesting to examine the role of self-esteem in paranoia and to evaluate the effects of COMET on paranoid delusions.

The participants in the present study had severe psychotic and mood symptoms. At baseline all patients heard voices on a daily basis, which caused suffering and affected their daily living. In total, 62% (24 out of 39) of the COMET + TAU group and 61% (23 out of 38) of the TAU alone group had clinical levels of depression; these patients are not easy to treat. Most were demoralized after several unsuccessful medication regimens, and after a decade of episodes of hearing voices that disturbed their normal life to some extent. This probably explains the lack of effect on the voice frequency/unpleasantness, and may explain why all the dropouts were in the treatment condition. Qualitative evaluation of the experiences of the therapists revealed that some patients could not be motivated to practice the re-living five times each day. Some dropouts did not want to do homework exercises, others could not vividly imagine long-gone positive personal experiences to the extent that they could re-live these strong positive emotions. The variability in the ability to imagine has been reported by others and could imply that specific attention is needed to train patients to use imagery (Steel *et al.*, 2010). Some patients had lived such unhappy lives that they could not think of any positive experiences. For these patients, a prolonged period of data gathering of personal qualities and involvement in activities that enhance a positive self-esteem, as in an earlier protocol for psychosis (Tarrier, 2002), might help to develop positive beliefs about themselves.

How does the protocol relate to other cognitive behavioural therapies and imagery techniques targeted at improving self-esteem? The protocol of Tarrier (2002) resembles the second stage in the COMET protocol, in which the counter theme is strengthened. The protocol reported by Tarrier focuses on acts that enhance a positive self-esteem and encourages the performance of these behaviours more often. Their protocol was tested and found to be effective in increasing self-esteem, decreasing psychotic symptoms,

and improving social functioning at end of treatment and at 3-month follow-up (Hall & Tarrier, 2003; Tarrier, 2002).

Another resemblance is the two-chair technique to elaborate a positive self-schema that has an emotional (lived) quality, and to use this experience to create a new model of self as emotionally and cognitively varied and changing (Chadwick, 2004). The goal is that a negative self-evaluation becomes just one of the appraisals of self and not *the* self. COMET also brings incompatible mood and self-esteem in connection with voice content. However, the theoretical underpinnings are different. Chadwick brings different aspects to each other to attain a more complex and relative self-concept with both positive and negative aspects. COMET tries to weaken the retrieval strength between voice content and negative self-esteem by repetitively combining voice content and lived positive self-esteem.

Manipulation of the images in the fourth stage is similar to the technique that Morrison used in a case report. The patient found that manipulating a distressing visual intrusion as if it were a video that you can play fast forward, freeze, etc. in combination with humour (an interruption from an amusing advertisement) was successful in reducing his distress and strengthening the belief that the image was just an image (Morrison, 2004).

The strength of the present study is that in a severely ill group of hallucinating schizophrenia patients, COMET was able to change depression by changing self-esteem and the acceptance of the voices. The intervention is manualized and can be taught to cognitive behavioural therapists in 4–8 hr (depending on the experience level of the therapist). In the present study, about 50% of the therapists were Master's students in psychology, or assistant cognitive behavioural therapists. The remaining therapists were well experienced in working with psychotic patients.

Another strength is that COMET is not a therapy, but a technique. It can be used in regular CBT at moments that strong emotions pertaining to the perceived negative meaning of the voices keep interfering with functioning, while patients already cognitively know that these annoying but harmless psychic phenomena should not bother them. Thus, the technique offers a transdiagnostic tool that uses emotive imagery to change the strengths of emotional memory networks by raising the threshold for activating negative emotional networks.

A limitation of the present study is the relatively small sample and the dropouts in the COMET condition. About 28% of the targeted population is not able and/or willing to comply with the intervention procedure. In future, evaluations this imagery technique must be practiced to a higher level of mastery with the patients, and should be maintained over a longer period.

Another limitation is that COMET + TAU protocol was compared to TAU alone. The effects might be non-specific and simply a result of extra treatment and more personal attention from the therapist. However, we believe this is unlikely because the change in self-esteem resulted in less depression and a change in voice appraisals as predicted by the models in the literature. The voices themselves did not show a statistical improvement. Had only non-specific factors been active, one would expect small-to-medium changes on a variety of unrelated measures.

A third limitation is that there are no follow-up data. One may expect that a relatively short intervention will have an effect only during a short follow-up period. The technique should be used within regular CBT and probably needs booster sessions to keep the competitive positive networks dominant. A subsequent step could be to evaluate the effect of COMET after extended practice compared to an attention placebo or an active condition with a long-term follow-up.

The significance of this study for clinicians is that depression can be ameliorated in patients with persistent auditory verbal hallucinations. The changes were not caused by reasoning, verbal challenge, or guided discovery as in CBT, but by the use of imagery techniques. This provides the clinician with an extra tool to treat persistent voices when traditional CBT has reached its limit, or when patients are not open to questioning their voice appraisals. The training is manualized and can be successfully taught to therapists with little experience in therapy. At the end of treatment, the effects of COMET are medium to large.

In the present study, we included patients with persistent hallucinations and a high level of suffering. A future study might compare CBT with CBT + COMET to examine the additional value of COMET within routine CBT, and a future study should also evaluate beneficial effects at follow-up.

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